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An experimental study of corporate social responsibility through charitable giving in Bertrand markets

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An Experimental Study of Corporate Social Responsibility through Charitable Giving in Bertrand Markets

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An Experimental Study of Corporate Social Responsibility through Charitable Giving in Bertrand Markets^{*}

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Abstract

We experimentally investigate a Bertrand market with homogenous goods where sellers may behave socially responsible by donating a share of their profits to an existing non-profit organization. In our experiment, we find that this Corporate Social Responsibility (CSR) component is used independent of its credibility. However, market outcomes in terms of prices and profits do neither significantly differ with respect to the credibility of the CSR component nor in comparison to a market without the availability of CSR components. Moreover, prices have the main impact on purchase decisions while higher donations only affect purchase decisions when they are credible and price differences are negligible. We conclude that competition severely limits the possibility to attract customers with CSR components. Actual donations are small and the burden induced by the CSR components is shifted partly to the buyers resulting in equal profits in all treatments.

JEL-classification: C92, D22, M31

Keywords: Corporate Social Responsibility, Competition, Charitable Giving, Experiment

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1 Introduction

Nowadays, consumers are increasingly confronted with goods that come with a social or environmental cause attached to it. For example, companies offer to vaccinate a child in Africa for each package of diapers sold, donate 1 Euro to saving the rain forest for each crate of beer sold, or label their goods with a Fair Trade label which certifies that the producers of a particular good are offered fair trading conditions in their home countries. This marketing method, also known as cause-related marketing, is a special type of corporate social responsibility (CSR) which has received a lot of attention in the economic literature recently. There are a number of studies – either survey based (e.g. Loureiro and Lotade, 2005) or experimentally (e.g. Frackenpohl and Pönitzsch, 2013) – claiming that customers are willing to pay a premium when private goods are bundled with CSR efforts. In our study we shed light on the effect the possibility to invest in CSR activities has on price competition among firms: Can firms use CSR activities to differentiate in competitive markets? Does CSR activity lead to higher prices and higher profits?

In order to address these issues we analyze experimental markets for multiple units of a homogenous good with two sellers who engage in price competition and two buyers. Sellers can announce a donation to a non-profit charity organization that will be attached to every unit they actually sell.¹ In our two main treatments we vary the credibility of the donation announcement. We compare behavior in a treatment where sellers can commit to the donation they announce to a treatment where a seller's actual donation may deviate from her previous announcement. An additional treatment where donations are not an option serves as control treatment.

In our data we find no significant differences in prices, donation levels, or profits in the treatment with credible donation announcements as compared to the treatment with non-credible announcements. Moreover, none of the two treatments yields different levels of prices or profits as compared to the control treatment without the possibility to donate. Typically, buyers tend to choose the seller with lower posted price in all treatments. Only if announced donations are credible and price differences are very small a higher announced donation has a positive impact on a buyer's purchase decision. In contrast, the effect of a higher announced donation is negative when it is non-credible, which indicates that buyers anticipate cheating on the donation level. Average sales prices are significantly higher than the minimum price in all treatments. On average, actual donations are strictly positive but at a low level and do not significantly differ across the two CSR-treatments. The cost burden they constitute is small enough not to cause any treatment differences in buyer and seller profits.

The paper is organized as follows. In Section 2 we summarize the literature related to our study. Section 3 describes the experimental design and section 4 presents the experimental results. Finally, section 4 concludes.

¹In the experiment the respective buyers choose the particular charity organization receiving the donation generated by their own purchase. This is done to ensure that the purchase decision is driven by the buyer's preference to donate in general rather than by her preference regarding a specific organization.

2 Related Literature

There is no uniform definition of CSR in the economic literature. Various studies refer to the definition of the Commission of the European Communities (2002, p. 3) which describes CSR as “a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis”. An alternative definition is provided by the World Bank (2007) that refers to “the commitment of businesses to behave ethically and to contribute to sustainable economic development by working with all relevant stakeholders to improve their lives in ways that are good for business, the sustainable development agenda, and society at large”. In their comprehensive survey of the economic CSR literature Kitzmueller and Shimshack (2012, p. 53) propose a definition integrating the basic conceptual features of the different definitions encountered in the literature describing CSR as “corporate social or environmental behavior that goes beyond the legal or regulatory requirements of the relevant market(s) and/or economy(s).” CSR may typically address a variety of aspects. CSR might affect the relationship between employer and employees, the way suppliers are treated, or even by which criteria they are selected. CSR might involve environmental aspects such as air and water pollution or sustainability of raw material production. In our study we focus on CSR towards non-profit organizations, particularly on the idea of cause-related marketing, where a donation to a third party is strategically bundled by firms with the sale of a private good. The relevance of customers’ social and environmental preferences for corporate profits has been recognized by Baron (2001) who introduced the term “strategic CSR” to describe CSR behavior induced by demand side pressure resulting from social preferences.

Baron (2008) theoretically investigates the interaction of the ability of managers, managerial incentive systems, consumer preferences, and social expenditures. The focus lies on the link between financial and social performance of a firm. While causality may go in either direction, one important explanation for incentive systems that incorporate social performance is that consumers may reward the firm for its social expenditures. A higher demand for social goods leads to a positive correlation of manager compensation and social expenditures, thus encouraging managers to spend more for social goods which, in turn, maximizes their salary. Bagnoli and Watts (2003) analyze the effect of the degree of competition between firms on the level of CSR in a market with homogenous, socially responsible consumers. They conclude that firms compete for consumers who care for CSR and thus are willing to pay a premium for it by providing public goods privately. The level of this provision varies inversely with the degree of competition: a higher degree of price competition prevents firms to charge a mark-up to invest in CSR. Besely and Ghatak (2007) model a market with price competition and heterogeneous consumers, i.e. customers who either do or do not have preferences for CSR in form of a contribution to a public good.² Their analysis results in a unique separating equilibrium where firms

² The notion that donations to charity can be interpreted as a contribution to a public good is also referred to by e.g. Andreoni (1990), Glazer and Konrad (1996), Elfenbein et al. (2012).

serve either one of both types of customers, i.e. some firms offer a standard private good at competitive prices for “neutral” consumers while other firms also contribute to the public good and charge higher prices serving “caring” consumers. Furthermore, they extend their model by relaxing the assumption of a credible promise to provide public goods, i.e. firms may renege on their promise. They conclude that the resulting optimal level of CSR is lower than when perfect monitoring of the public good provision is possible.

There exist a number of empirical studies claiming that customers have a higher willingness to pay for goods that have some CSR feature attached to them. Loureiro and Lotade (2005) find in a survey that customers are willing to pay more for coffee with a fair trade label than for an otherwise similar product. Loureiro and Hine (2002) identify a higher willingness to pay for local products as compared to organic products and products free of genetically-modified organisms. Loureiro (2003) finds that customers have a higher valuation for environment friendly wines than for regular wines. Johnston and Roheim (2006) find similar evidence for seafood. All of these studies rely on stated preference measures which are elicited by using survey techniques with hypothetical questions. The answers to such hypothetical questions are prone to socially desirable answer behavior and thus might not reflect the true preferences of individuals. In another empirical study Fernández-Kranz and Santaló (2010) find evidence that higher competition levels within a market lead to more CSR activity, conjecturing that CSR investments are used by the firms strategically. A combination of survey and experimental techniques is used by Barone et al. (2000) who investigate determinants of the influence of cause-related marketing efforts on consumer choice of products. They find that the higher the perceived motivation of a company to support a cause is the more likely it is that consumers choose its product. When products differ in terms of price or performance they find that, although most consumers choose the good with the lower price, many are still willing to trade off higher perceived CSR for higher prices. However, the drawback of this study is again the fact that participants take hypothetical decisions in hypothetical scenarios.

Field and laboratory and experiments offer the opportunity to elicit preferences in settings where decisions have consequences. Arnot et al. (2006) find in a field experiment at a coffee shop that buyers of fair trade coffee were much less responsive to relative price differences than purchasers of other coffee products. Hainmueller et al. (2011) also conduct a field experiment in a grocery store where they investigate the effect of Fair Trade labels on coffee sales. They find that the introduction of labels leads to an increase of sales of coffee and that there exists a subset of customers who are willing to pay a premium for labeled goods. Frackenpohl and Pönitzsch (2013) conduct a laboratory experiment to elicit individuals’ willingness to pay for a “hybrid bundle” of a private good and a donation to charity. They find that individuals are willing to pay a premium when private goods are bundled with donations, i.e. the sum of the prices individuals are willing to pay for the two components separately is lower. This study uses one specific good (a cup) as well as a fixed donation to one specific charity organization (internationally helping children in need) which might bias individual behavior due to certain preferences regarding the good and/or the charity organization. In contrast, our study uses an abstract good as well as a menu of different charity organizations to choose from. Furthermore, in our setting

we do not merely concentrate on consumer decision problems but on strategic interaction among buyers and sellers in a market environment where donations may be a price component.

There is also a number of laboratory experiments using posted offer markets where sellers may invest in CSR activities under price competition. Barreda-Tarrazona et al. (2011) investigate a market with nine sellers and nine buyers where firms can invest in CSR by choosing their discrete contribution level to a public good irrespective of their sales. The public good benefits all members of the experimental group directly (sellers and buyers alike). Contributions are understood as long term investments which is why they can only be changed every sixth period. The treatments vary the marginal per capita return of public good contributions and the extent of information about previous seller and buyer behavior. A market without the possibility of contributing to a public good constitutes the control treatment. The authors find that higher prices are paid when contributions to a public good are possible. However, the price increase is not high enough to compensate for public good contributions. This is partly due to the fact that contributions are made whether or not a positive number of goods is sold.

Rode et al. (2008) examine an experimental triopolistic market with six consumers where one exogenously determined seller has fixed higher production costs. In the main treatments the extra cost is attributed to ethical concerns, i.e. the cost difference is donated to a specific NGO. The exact cost difference is either known or unknown to consumers. In a control treatment the cost difference is neutrally framed, i.e. not justified by ethical concerns, and known to the consumers. The authors find that consumers are willing to pay higher prices for ethically differentiated products irrespective of the knowledge about the exact cost difference. In the control treatment where higher costs are not associated with ethical concerns, consumers typically buy at the lowest price .

Etilé and Teyssier (2011) conduct a laboratory experiment to investigate the signaling effect of CSR labels in a posted offer market with eight sellers and twelve buyers. Their design is closely related to that of Rode et al. (2008), the main difference being that sellers may freely choose the donation levels, which again induces higher production cost. Donations are subscribed to one of four NGOs determined by the seller. The exact amount of additional cost as well as the specific NGO are unknown to consumers. Furthermore, sellers' cannot be tracked over time, i.e. they cannot establish reputation. The paper presents a baseline treatment where sellers have no possibility to communicate their production cost, and three main treatments to investigate different types of labeling products. In one treatment sellers can post a label reliably signaling a minimum donation per unit sold. In the other two treatments they may claim to have this label also in case they donate less than the minimum requirement, where cheating is detected with probability $\frac{1}{3}$. In one of those treatments sellers are identifiable. Etilé and Teyssier find that sellers can successfully differentiate products when labels are credible or reputation can be established, as some buyers are willing to pay higher prices for labeled products and others buy unlabeled products at lower prices. Significant lower profit margins for sellers and higher donations at the same time as compared to the basic treatment can only be achieved with credible

labels, though. When labels are not credible, they are used most of the time and prices, profit margins, and donations are similar to the baseline treatment.

Our study differs from the aforementioned literature in several respects. In line with some studies we use donations to charity as a possible CSR component (in contrast to a public good mechanism within the experiment). In contrast to existing studies, the exact donation is observable by the buyers (if sellers have commitment power). This enables us to investigate at which level donations establish, whether firms differentiate by using different donation levels, and other interesting patterns. Moreover, in our study buyers (not sellers) choose the charity organization which benefits from donations that are caused by their purchases. Buyers choose from a menu of five possible NGOs. This feature makes donation components more valuable for the sellers as a strategic instrument, by ensuring that donations in general are appreciated by buyers. One could argue that our design focuses on the strategic motivation of a seller to use CSR and less on his intrinsic motivation. This is particularly interesting in comparison to Etilé and Teyssier (2011) where the NGO is chosen by a seller, putting more emphasis on the seller's intrinsic motivation. Finally, in contrast to other papers we choose a small market with only two sellers and two buyers in order to give differentiation a chance and to contrast behavior in our experiment with the findings of studies examining larger markets.

3 The Experimental Design

Design

In all treatments each experimental market consists of two buyers and two sellers. Each group of players stays together throughout the 30 periods played (fixed matching). Within each group of four participants the roles of buyers and sellers are assigned randomly at the beginning of the experiment and do not change throughout the experiment. To make it possible to identify sellers and keep track of their offers are labeled seller 1, seller 2, and buyers are buyer 1, and buyer 2, accordingly. Those labels are observable by all participants within a group. Earnings are expressed in ECU (Experimental Currency Unit).

Each period, sellers may sell up to eight units of a homogenous good at zero unit production cost. Each period, sellers simultaneously and independently determine a posted price per unit for their good. In each period a seller's posted price applies to all units sold by that seller, i.e. price differentiation across units offered is not possible within one period. At the same time, sellers announce an amount per unit that they would donate to charity in case the unit was sold. The minimum posted price is ECU 5. We chose this minimum price to prevent too asymmetric buyer and seller profits in our experiment as a result of strong price competition. Furthermore, this minimum price ensures that sellers can always announce and realize donations without incurring losses. The announced donation must be at least ECU 0.

After the sellers made their decision buyers observe each seller's posted price as well as her announced per unit-donation. Buyers then simultaneously and independently decide to buy up to 4 units of the good. Buyers

are free to divide their total demand among both sellers. A buyer's valuation of each unit bought is ECU 20 throughout the experiment. If a buyer buys a unit associated with a donation, the buyer herself has to determine one of five possible non-profit organizations that should receive the donation implied by her purchase. This procedure, which is explained in detail below, impedes that buyers react differently to CSR activities by firms just due to their individual preferences over particular charity organizations.

At the end of each period, each seller receives information about both sellers' posted prices and announced donations as well as her own sales volume and her resulting profit. Buyers also receive information about their own profit but are not informed about the other buyer's purchase decision.

We conducted three treatments (see table 1): In treatment CSR_C sellers have **Commitment power**, i.e. they have to donate exactly the amount they had announced initially, which is common knowledge. In treatment CSR_NC sellers have **No Commitment power**, i. e. they are free to deviate from their initially announced donation amount just after they learned their sales volume. Again, this is common knowledge. In this treatment no one besides the respective seller herself learns about a seller's extent of cheating, i.e. the difference between announced and actual donation. Finally, in treatment NO_CSR sellers cannot donate to a charity organization. The treatment NO_CSR serves as baseline treatment where sellers only engage in price competition.

	CSR effort possible	Commitment Power
CSR_C	Yes	Yes
CSR_NC	Yes	No
NO_CSR	No	-

Table 1: Treatments

Choice of charities

In our experiment we are interested in the question whether donations as a price component increase the willingness to pay for a good. In such a context, low reactivity to CSR components can either be caused by a particular customer's clear focus on a low price only, or by disagreement with the particular charity organization that should benefit upon sale. In order to largely exclude the second motive we conducted a survey among the student population at Nuremberg Campus of University of Erlangen-Nuremberg prior to the experiment where we identified the five most popular charity organizations which cover a broad spectrum of objectives (i.e. they included organizations with local, environmental, and humanitarian objectives).⁴ In the experiment customers could then choose among five popular organizations that could benefit from the donations caused by their purchases. This procedure largely excludes the possibility that participants are

⁴ The top 5 non-profit organizations were UNICEF, SOS Kinderdörfer, WWF, Brot für die Welt, and Nürnberger Tafel e.V.

unwilling to purchase a good with a donation attached to it simply because they do not agree with a specific charity organization.⁶

Procedure

All experimental sessions were computerized using z-Tree (Fischbacher, 2007) and were conducted at the Laboratory for Experimental Research Nuremberg (LERN) in December 2012. Recruitment took place using ORSEE (Greiner, 2004). We had a total of 96 participants divided into groups of four, resulting in 8 independent observations per treatment. Instructions were handed out in written form and included control questions to make sure that every participant understood the rules of the experiment. At the beginning of the experiment each participant (buyers and sellers) received an initial endowment of ECU 80 in order to preclude general losses. At the end of the experiment earnings were exchanged in cash at a rate of € 1 per ECU 80. Sessions lasted approximately 90 minutes and average earnings were € 17.35 (CSR_C), € 17.80 (CSR_NC) and € 18.33 (NO_CSR). Donations made during the experiment amounted to € 21.90 (CSR_C) and € 11.30 (CSR_NC).

4 Results

This section reports the results of our experiment. In section 4.1 we first give an overview of market performance across treatments, i.e. posted and sales prices, buyer and seller profits, as well as the level of donations. Section 4.2 then digs deeper into purchasing behavior of buyers in our different treatments in order to provide insights how purchasing decisions are affected in markets with CSR activities.

4.1 Market Outcomes

We first look at the prices sellers charge for their goods. Figure 1 shows the average sales prices (mean over all groups) over time for all three treatments, where the average sales price is determined by weighting both sellers' posted prices with their respective sales volume (for each group and period):

$$average\ sales\ price = \frac{posted\ price_1 \cdot sales\ volume_1 + posted\ price_2 \cdot sales\ volume_2}{sales\ volume_1 + sales\ volume_2}.$$

In all treatments we initially observe rather high average sales prices which drop rather quickly to a stable level that is maintained throughout the remaining periods. The steep initial decline indicates substantial learning during the first five periods, so we exclude them from all following statistical analysis. We deal with the last five

⁶ One might argue that people are not willing to donate because they feel too detached from the respective cause. The fact that most of the donations generated in our experiment went to Nürnberger Tafel e.V., a local organization giving food to the homeless, supports the notion that attachment to the cause plays an important role. By leaving the choice of the cause in the buyers' hands, our design eliminates any problems that may arise.

periods in the same way in order to exclude any endgame effects from our analysis. Analysis of periods 6 to 25 reveals that there is no trend in average sales prices in any treatment.⁷ Overall, average sales prices stay substantially and significantly above the minimum price in all treatments (Sign Test, $p < 0.01$) and there is no systematic difference between the treatments (Whitney-Mann U-Test, $p > 0.1$). Especially the observation of higher than minimum sales prices in NO_CSR indicates that sellers seem to successfully collaborate in order to reach higher price levels. This is in line with findings by Huck et al. (2004) who present experimental evidence on Cournot competition with different numbers of sellers. They find that in markets with only two sellers collusion sometimes occurs, while Nash equilibrium seems to be a good predictor for markets with three sellers. When there are four or more sellers market outcomes tend to be more competitive than in the Cournot outcome. As our observation indicates, this result seems to apply to Bertrand markets with two sellers as well.

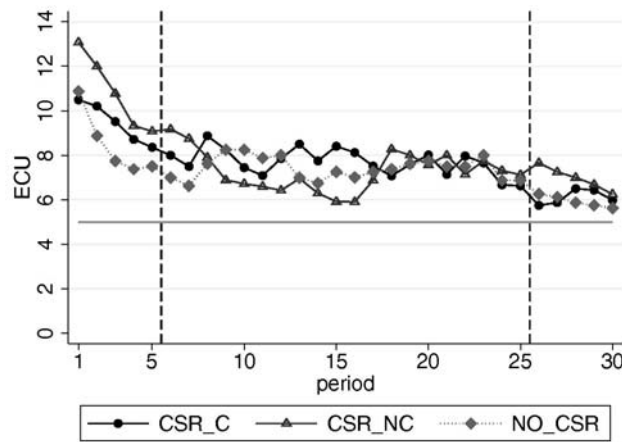


Figure 1: mean average sales prices over time

Figure 2 illustrates how the possibility of donation is actually used by the sellers. For treatments CSR_C and CSR_NC separately, both the mean average sales price and profit per unit are displayed, i.e. the gap between both lines represents the size of the average actual donation for each unit sold.⁸ During the first five periods there is a strictly positive average actual donation in both treatments. Later on, in periods 6-25, the average actual donation shrinks and is in more periods not significantly different from zero in CSR_NC than CSR_C (50% vs. 35%).⁹ To a certain extent, sellers in CSR_NC seem to learn that CSR components have no benefit because their credibility cannot be checked by the buyers and thus, announcements are cheap talk. In CSR_C, however, where donation announcements are credible, they are potentially useful to sellers as a strategic instrument. Near the end, sellers in CSR_C even accept donations causing profits per unit below the minimum price which is

⁷ Comparing the respective means of the first and the second half of the relevant periods (6-25) with a two-tailed Wilcoxon Signed Rank Test reveals no significant difference in all treatments. The distinct upward shift of the average sale price in CSR_NC at the beginning of the second half of the experiment is caused by one single observation (group 2, see Figure A-1 in the Appendix).

⁸ Analogously to the average sales price actual donation is defined as
$$actual\ donation = \frac{donation_1 \cdot sales\ volume_1 + donation_2 \cdot sales\ volume_2}{sales\ volume_1 + sales\ volume_2}.$$

⁹ We tested this for each period separately by conducting a Sign Test at the 10% significance level.

in line with the findings of Barreda-Tarrazona et al. (2011) where sellers even generate losses in the long-run by overinvesting in CSR. However, there is no statistically significant trend in average actual donations for either treatment.¹⁰

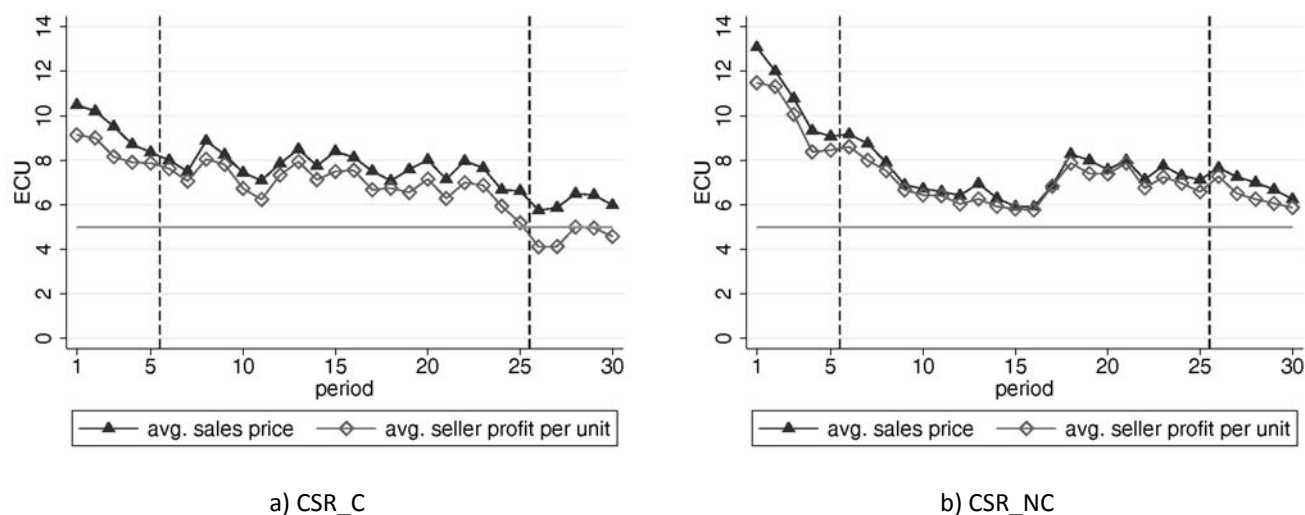


Figure 2: average sales price and average seller profit per unit

Means for periods 6-25	CSR_C	CSR_NC	NO_CSR
posted price per unit	8.92 (3.88)	8.01 (3.15)	8.31 (3.42)
average sales price per unit	7.71 (2.72)	7.28 (2.62)	7.42 (2.75)
announced donation per unit	0.82 (1.65)	<*** 0.0013 (12.99)	6.19 (0.56)
actual donation per unit	0.73 (1.06)	0.36 (0.56)	
profit per unit = (average sales price – actual donation)/unit	6.98 (3.22)	6.92 (2.53)	7.42 (2.75)
sellers' profit	26.05 (27.41)	26.88 (24.70)	28.88 (28.06)
buyers' profit	47.22 (14.62)	50.22 (11.71)	49.80 (12.29)
sales volume (per buyer)	3.80 (0.83)	3.93 (0.46)	3.93 (0.47)

Table 2: global comparison of treatments (std. dev. in parenthesis, the inequality signs indicate significant differences according to a two-tailed Mann-Whitney U-Test), all prices and profits in ECU

¹⁰ A two-tailed Wilcoxon Signed Ranks Test revealed no significant difference between the averages of the first half and the averages of the second half of the relevant periods (6-25).

Table 2 summarizes the overall means and standard deviations of the main variables of interest over all groups for the relevant periods 6 to 25.¹¹ *Posted price* and *announced donations* indicate values prior to the buying decision. While there is no significant difference between *posted prices* across treatments *announced donations* are significantly higher in CSR_NC as compared to CSR_C (two-tailed Mann-Whitney U-Test, $p < 0.01$).¹² While in CSR_C sellers commit to a donation amount announcements in CSR_NC are cheap talk and thus lying is costless leading to frequently exaggerated donation announcements.¹³ In both treatments, CSR_C and CSR_NC, *average sales prices* and *profits per unit* are significantly above the minimum price (Sign-Test, $p < 0.01$). Furthermore, we observe strictly positive *average actual donations* in both CSR-treatments which do not differ significantly across treatments. Our analysis indicates that donations are not the cause for prices above the minimum price since neither in CSR_C nor CSR_NC there is a correlation between *average sales prices* and *actual donations* (Spearman's Rho 0.2275 ($p = 0.5878$) and -0.2857 ($p = 0.4927$), respectively). This is in line with the observation of similar prize levels in the CSR treatments and in NO_CSR. The *actual donations* constitute a cost burden to sellers which they might shift to or share with the buyers by asking higher prices. The fact that neither *seller profits* nor *buyer profits* are affected by the availability of CSR – whether credible or non-credible – indicates that the average burden is small and only partly shifted to the buyers.

Result 1 (Market Outcomes)

- (i) *The availability and use of (credible or non-credible) CSR in a Bertrand market does not significantly change prices or profits as compared to a treatment without CSR.*
- (ii) *The credibility of CSR does not significantly affect prices, donations, and profits. Only announced (but not realized) donations are significantly higher when CSR is not credible.*
- (iii) *On average, positive amounts are donated irrespective the credibility of CSR.*
- (iv) *Neither average prices nor donations follow a trend over time.*

The fact that market outcomes do not significantly differ across treatments leads to the conclusion that price competition severely limits the possibility to attract customers by CSR activities (if those are available to everyone). However, the yet positive use of CSR indicates either an intrinsic motivation to engage in charitable giving or points to a risk to lose customers if a seller completely abstains from using CSR. The fact that actual donations are strictly positive and do not significantly differ between CSR-treatments rather points to some intrinsic motivation. We will analyze the buyers purchasing behavior decisions in much detail in the following section.

¹¹ We observe some heterogeneity in behavior among groups (see Figure A-1 in the appendix).

¹² For all values discussed in this section we conducted pairwise two-tailed Mann-Whitney U-Tests.

¹³ There was one particular group announcing especially high donation amounts. Excluding them from the data would lead to lower mean of 3.64, but the difference between treatments would remain highly significant ($p < 0.01$).

4.2 Determinants of Purchase Decisions

In order to investigate the question whether and to what extent donations affect the purchase decision of buyers, we run logit regressions for the treatments CSR_C and CSR_NC separately. Note at this point that the buyers' decisions are taken based on the *posted prices* and *announced donations* of the sellers. For reasons of readability we simply use the terms price and donation instead of posted price and announced donation throughout this section. The dependent variable in our initial regressions is a binary variable indicating whether a seller sells strictly more units than her competitor. From seller 1's perspective, that means that it takes the value 1 if seller 1 sells strictly more units than seller 2, and the value 0 if seller 1 sells strictly less units than seller 2. The cases where both sellers sell an equal number of units are omitted from the regression. By applying this selective definition we are able to clearly identify which choice of price and donation makes a seller more successful than the other.¹⁴ Note that due to the definition of our dependent variable only data points from one seller out of each matching group (we choose seller 1) should be included in the regression analysis as adding data points from the second seller would artificially double the data and foster significance of effects because they exactly mirror the data points of seller 1. As independent variables we use $\Delta\text{price} = \text{posted price}_1 - \text{posted price}_2$ and $\Delta\text{donation} = \text{announced donation}_1 - \text{announced donation}_2$ in the respective period.

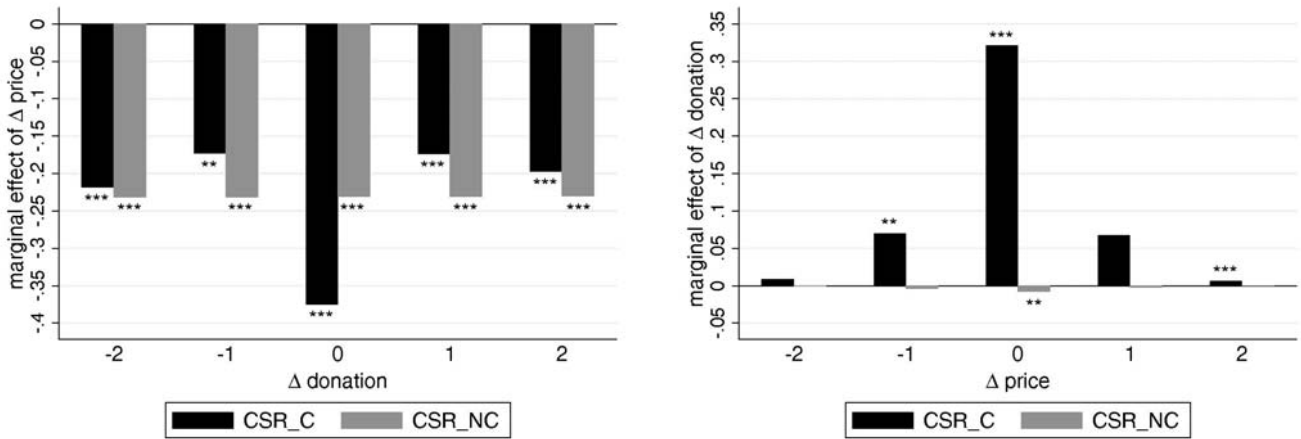
	CSR_C	CSR_NC
Δprice	-5.005** (2.247)	-2.345** (1.008)
$\Delta\text{donation}$	2.234*** (0.607)	-0.034** (0.016)
Constant	-0.033 (0.396)	-0.274 (0.247)
N	141	138
Log pseudolikelihood	-23.890	-39.270
Pseudo R ²	0.751	0.589

Table 3: Logit regression estimates (clustered standard errors in parentheses); dependent variable "1 = seller 1 sold strictly more units than seller 2, 0 = otherwise"; levels of significance: $p < 0.01$ (***), $p < 0.05$ (**), $p < 0.1$ (*)

Table 3 reports the estimation results. Standard errors are clustered by matching groups. In both treatments the price difference has a significant negative effect on being the successful seller. The higher a seller's price as compared to her competitor's price the less successful he is. However, differences in announced donations have different effects in both treatments. In CSR_C, where sellers can credibly commit to their announced

¹⁴ Relaxing this definition to include the cases of equal sales volumes would yield qualitatively very similar regression results.

donation, announcing a higher donation than one's competitor makes a seller more successful. In contrast, announcing a higher donation in CSR_NC makes a seller less successful. This might be due to the fact that buyers know that donation announcements are cheap talk and thus, may perceive a high announced donation as mere bait shedding a bad light on the respective seller. As a result, buyers may negatively reciprocate this announcement behavior by less likely buying from the respective seller.



a) marginal effect of price difference ($\Delta price$) for fixed donation differences (x-axis)

b) marginal effect of donation difference ($\Delta donation$) for fixed price differences (x-axis)

Figure 3: marginal effects of the independent variables at different relevant values of the respective other independent variable; levels of significance: $p < 0.01$ (***), $p < 0.05$ (**), $p < 0.1$ (*)

We also calculated the marginal effects of the independent variables ($\Delta price$ and $\Delta donation$) at different relevant values of the respective other independent variable to shed more light on the impact of price and donation differences for the buyers' purchase decision. Figure 3a shows the marginal effect of the price difference at different donation differences for each treatment.¹⁵ All values are statistically significant, mostly on the 1%-level. In CSR_NC the marginal effect is always the same, indicating that a lower price is equally important for the purchase decision irrespective of the donation difference. In CSR_C, in contrast, the marginal effect of the price difference is substantially higher if donations of both sellers are equal than in case they differ. The analysis thus shows that buyers indeed seem to care about (credible) donations to some extent while non-credible donation announcements do not seem to affect their decisions. Figure 3b displays the marginal effect of the donation difference at different price differences. The data clearly show that only if donations are credible, they substantially affect purchasing decisions. In CSR_NC, where donation announcements are not credible, the marginal effect is only significant for a price difference of zero ($p < 0.05$), where it is actually negative. The negative sign (buyers rather buy from the seller with the lower announced donation if there are no price differences) is driven by a negative reaction to large (and possibly exaggerated) announced donation differences. In CSR_C, on the contrary, the marginal effect is substantial and significant

¹⁵ For example, the largest bar in Figure 3a for CSR_C shows that one seller's increase in price difference by one unit produces a 0.37 decrease in the probability of him being the more successful seller if the (announced) donation difference equals 0.

($p < 0.01$) when the price difference is zero and still of considerable size when prices do not differ much. But although buyers clearly care for credible donations in CSR_C the marginal effect of the (announced) donation difference is never larger than the marginal effect of the price difference, i.e. the CSR component of the good cannot completely compensate for the price difference. In sum, we can conclude from this analysis that a low price is the main driver of the purchase decision irrespective the credibility of the donation announcement. When sellers can commit to a donation the announcement of a higher donation has a positive impact on their sales when price differences are small (or zero).

We now briefly shed some light on the anticipated seller behavior that could cause no or even negative reactions to higher donations in the absence of credible announcements. Table 4 illustrates the degree of cheating observed in our data, i.e. it reports the differences between announced and actual donations in CSR_NC. Note that the table covers only traded units, since only for those units we have information on the actual donation made by the respective seller. While most sellers announce a positive donation but then donate zero (73% of sold units), there is a substantial proportion of sold units (27%) which sellers bundle with a strictly positive actual donation, in 10.43% of all cases they are even totally honest, i.e. donating as announced.¹⁶ It can be clearly seen from the table that the bulk of actual donations are made when announcements were small or moderate. When announced donations were large, however, almost no seller actually donated anything. Buyers seem to correctly anticipate this behavior and behave accordingly, which might explain the negative effect of the donation difference in CSR_NC.

		actual donation						total
		0	1	2	3	4	5	
announced donation	0	31						31
	1	118	90					208
	2	112	21	10				143
	3	181	58		0			239
	4	184	30	12		0		226
	5	99	46	26			0	171
	6	53	8					61
	7	26		14	7			47
	8	20		8				28
	9	21						21
	10	9					6	15
	11	0						0
	12	9		2				11
	>12	55						55
total		918	253	72	7	0	6	1256

Table 4: announced and actual donations in CSR_NC, absolute frequency of sales

¹⁶ Not to decrease a strictly positive announced donation to zero ('partial cheating') may merely reflect the sellers' own preference to donate because due to its invisibility to the buyer the actual donation has no strategic value. It may also be interpreted as some kind of guilty conscience which would be in line with findings by Fischbacher and Föllmi-Heusi (2013) and Eisenkopf, Gurtoviy and Utikal (2011).

We finally take a look at buyers' purchase decisions from a different angle. Tables 5(a) and 5(b) consider focused purchases, i.e. transactions where a buyer purchased from only one seller in a given period. Separately for treatments CSR_C and CSR_NC the tables show the relative frequencies of focused purchases under different conditions. For example, in CSR_C 16% of the focused purchases took place if the respective seller had a lower price and a higher announced donation (upper left cell in table 5(a)). The fraction of transactions that are focused purchases is nearly identical in both treatments (73% in CSR_C and 72% in CSR_NC).

		announced donation			
		higher	equal	lower	total
posted price	lower	16	8	38	62
	equal	33	1	4	37
	higher	1	0	0	1
	total	50	9	41	100

a) focused purchases in CSR_C (73% of all traded units)

		announced donation			
		higher	equal	lower	total
posted price	lower	18	15	38	71
	equal	16	7	3	26
	higher	3	0	0	3
	total	37	23	40	100

b) focused purchases in CSR_NC (72% of all traded units)

Table 5: distribution of focused purchases by different combinations of posted prices and announced donations in % when at least one announced donation is strictly positive, relevant periods 6-25.

When buyers focus their purchase and posted prices are unequal the majority of units are bought from the seller with the lower price, irrespective of the announced donation (62% in CSR_C and 71% in CSR_NC). Only few buyers focus their purchase on the more expensive seller, and if so, only when the respective announced donation is higher (1% in CSR_C and 3% in CSR_NC). When focusing their purchase and posted prices are equal, though, buyers mostly choose the seller with the higher announced donation, even more so when the announced donation is credible.¹⁸

Tables 6(a) and 6(b) consider mixed purchases, i.e. transactions where a buyer divided her total purchase among both sellers (symmetrically or asymmetrically) in a given period. The fraction of transactions that are mixed purchases is nearly identical in both treatments (27% in CSR_C and 28% in CSR_NC). Separately for treatments CSR_C and CSR_NC the tables show the relative frequencies of mixed purchases under different conditions. In contrast to table 5 the depicted situations cannot be interpreted correctly by looking at single values. In order to grasp buyers' behavior for a given price/donation-constellation, one has to consider two opposite cells with respect to the bold center cell simultaneously because a mixed purchase constitutes a single decision involving both goods offered at the same time. For example, a buyer mixing a purchase when one offered good has a higher price and a higher announced donation (line 3, column 1) automatically also buys the good with the lower price and the lower announced donation (line 1, column 3).

¹⁸ 33% vs. 4% in CSR_C and 16% vs. 3% in CSR_NC.

		announced donation			
		higher	equal	lower	total
posted price	lower	0	1	29	30
	equal	14	29	7	50
	higher	19	0	0	20
	total	33	31	36	100

a) mixed purchases in CSR_C (27% of all traded units)

		announced donation			
		higher	equal	lower	total
posted price	lower	1	1	21	22
	equal	12	41	13	65
	higher	12	1	0	13
	total	24	42	34	100

b) mixed purchases in CSR_NC (28% of all traded units)

Table 6: distribution of mixed purchases by different combinations of posted prices and announced donations in % when at least one announced donation is strictly positive, relevant periods 6-25.

When buyers mix their purchase and the more expensive seller also has the higher announced donation, there is a substantial bias towards the cheaper seller (with the lower announced donation).¹⁹ Mixing purchases in these cases is even slightly more biased towards the cheaper seller in CSR_NC, indicating that buyers are less willing to trade off between high donations and high prices when announced donations are non-credible. Buyers mixing their purchase when posted prices are equal but differ in announced donations choose more units with a higher announced donation in CSR_C while in CSR_NC they almost equally mix between sellers with higher and lower announced donations.²⁰ Again, this difference might be due to the credibility of the donation announcement in CSR_C while in CSR_NC buyers rather mix the chance of the donation actually being made.

By and large, the observations from this additional look at the data generally corroborate our previous analysis of the determinants of purchase: A lower price is the main driver of the purchase decision. Buyers seem to care at least to some extent about donations when posted prices do not differ and therefore caring for donations is not costly for them. However, price differences mitigate this effect which is indicated by the fact that even mixed purchases of differently priced goods are biased towards the cheaper good as buyers are not generally willing to trade off higher donations for higher prices.

Result 2 (Purchase Decision)

- (i) Typically, the seller with the lower posted price is more successful than the other seller.
- (ii) Credible announced donations make a seller more successful only when posted prices do not differ (or price differences are small).
- (iii) Non-credible announced donations even have a negative effect on a seller's success as buyers seem to negatively reciprocate on the sellers' probably misleading announcement behavior.

¹⁹ 19% vs. 29% in CSR_C and 12% vs. 21% in CSR_NC.

²⁰ 14% vs. 7% in CSR_C and 12% vs. 13% in CSR_NC.

5 Conclusion

In this paper we present an experiment which investigates the impact of sellers' CSR activities on prices and profits in a Bertrand market. Sellers compete by simultaneously setting prices and announcing donations to non-profit charity organizations. We vary our treatments with respect to the credibility of the donation announcement, i.e. we compare behavior in a market where sellers can commit to the donation they announce to behavior in a market where a seller's actual donation may differ from her previous announcement. Additionally, we conducted a treatment where making a donation is not an option which serves as a baseline. We find that the availability and use of (credible or non-credible) donation announcements does not significantly affect prices, donations, and profits as compared to the baseline Bertrand market. We also do not find significant differences between CSR-treatments where the donation announcements are credible or not, respectively. Typically, lower posted prices are the main driver of a buyer's purchase decision. The impact of announced donations on the purchase decision is positive only if they are credible and price differences are very small. Interestingly, the effect of a high announced donation on the purchase decision is even negative when sellers have no commitment power. Average sales prices are significantly higher than the minimum price in all treatments. On average, actual donations are strictly positive and do not significantly differ across CSR-treatments. The cost burden they constitute is small and shared almost equally by buyers and sellers, with the effect that donations do not cause any differences in buyer and seller profits.

The fact that market outcomes do not significantly differ across treatments leads us to conclude that price competition severely limits the possibility to attract customers by CSR activities. Although buyers seem to care at least to some extent about donations, the effect of higher donations is strongly mitigated by price differences because buyers are not generally willing to trade off higher donations for higher prices. Nevertheless, sellers substantially use CSR activities indicating that by abstaining from using CSR sellers risk to lose customers because they might believe that at least some CSR activity is socially desirable. On the other hand, sellers might be intrinsically motivated to donate which is indicated by the fact that even in CSR_NC average actual donations are strictly positive and actual donations do not significantly differ between CSR-treatments.

Our findings are in line with Barone et al. (2000) who find that the perceived CSR effort must be high enough in order to compensate for buyers paying higher prices for a good. In our experiment, CSR efforts are only perceived as high when they are credible. Our experimental results do not confirm that buyers are willing to pay a premium for CSR efforts which Rode et al. (2008) find in a competitive experimental market and Frackenpohl and Pönitzsch (2013) find in an individual decision making experiment. However, we are in line with the insight of Rode et al. (2008) that the reliability of CSR efforts has no impact on buyer behavior which contradicts the results of Etilé and Teyssier (2011).

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Appendix

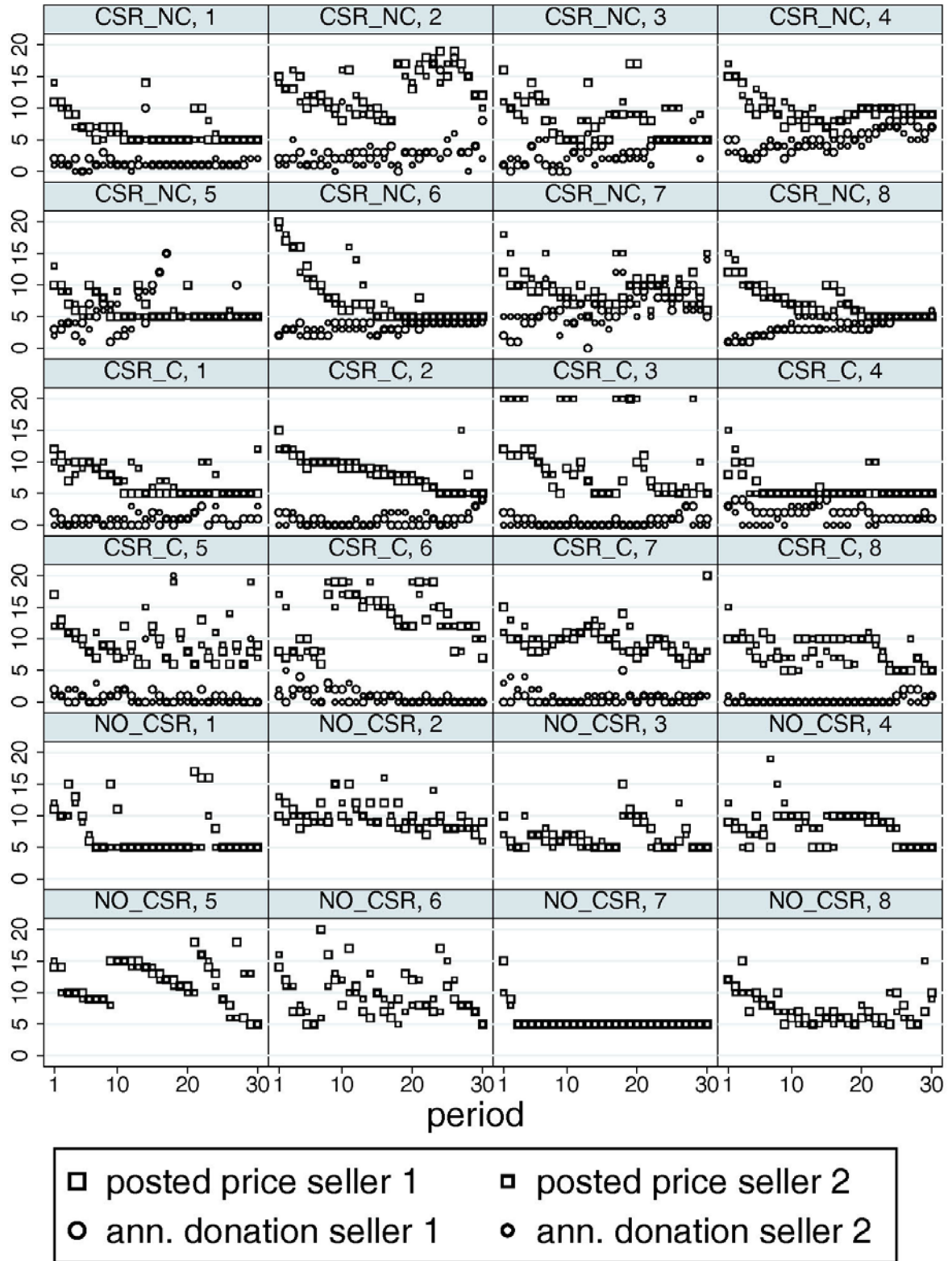


Figure A.1: posted prices and announced donations by treatments and group number (for readability reasons outlier announcements in group CSR_NC,5 were deleted)

Instructions for Treatment CSR_NC

(translated from our German version; the instructions for CSR_C differ with respect to the second seller decision, the instructions for NO_CSR do not include the option for sellers to announce a donation and, thus, for buyers to choose a charity organization; the other instructions are available on request)

Welcome to this experiment! You receive 2.50 Euro for showing up on time. Depending on your decisions and the decisions of other participants you can earn additional money during the course of the experiment; you will have to bear potential losses yourself.

During the experiment each participant owns a virtual account with an initial endowment of 80 ECU (*ECU = Experimental Currency Unit*). The current account balance is only affected by your own period's profits and losses and can be seen on your screen at all times. At the end of the experiment your account balance will be exchanged into Euro (exchange rate: 80 ECU = 1 Euro) plus the 2.50 Euro and paid to you in cash. The payment will be completely anonymous, i.e. no other participant will learn about your payment from us. **Any communication with other participants is prohibited during the entire experiment.** Compliance with this rule is **very important**. Otherwise the experimental results will be **scientifically useless**. Should you have any questions, please raise your hand. We will then come to you and gladly answer your questions individually.

1. Groups

The experiment lasts **30 periods**. At the beginning of the first period all participants will be **randomly** divided into groups of **four** participants each. Thus, besides yourself there are three other persons in your group. The composition of your group stays **unchanged** during the entire experiment, i.e. there are always the same participants in a group. In this experiment, your own group is not concerned with any other group. You will never learn who the other three participants in your group are, i.e. all participants act absolutely anonymously. Two of the four members of your group are randomly assigned the role of **sellers**. The other two assume the role of the **buyers**. The assigned roles do not change throughout the entire experiment. Each seller and buyer also receives an identification number (1 or 2) which also will not change during the entire 30 periods. Thus, in each group there are seller 1 and seller 2 as well as buyer 1 and buyer 2. The identification number only serves to identify the single group members and has no effect on any decisions or profits.

2. Decisions and sequence the game

2.1 General sequence of the game

In this experiment you operate in a market with two sellers and two buyers. **You will act either as a seller or a buyer.** In the following, sellers as well as buyers will have to make different **decisions**.

In the experiment sellers will have to offer a **product on the market** that may be combined with a donation to a charity organization. Sellers have to announce the selling price and the amount of the donation per unit. Buyers

have to decide **whether or not to buy** the offered units. Buyers can purchase between 0 and 4 units per period. When buying a product with a donation buyers have to choose a charity organization which the sellers have to make the donation per unit to. Only after the buyers' decision the sellers determine the actual donation amount they pay to the chosen charity organization.

2.2 First seller decision

At the beginning of each period each seller first has to decide on the integer price they would like to offer their product at. The minimum price for offering the product is 5 ECU. Sellers will not incur any production costs, i.e. at first, the seller profit results only from the posted price for the product and the number of sold units.

Furthermore, each seller decides which integer amount of one unit's return he would like to donate to a charity organization. Initially, the seller announces a donation amount per unit. He is **completely free to choose** any donation amount per unit. The minimum donation per unit is 0 ECU. Afterwards, the product will be offered to both buyers. Both sellers make their decisions simultaneously and independently, and the products can only differ in price and announced donation amount.

2.3 Buyer decision

After the sellers made their decision the buyers have to choose if and how many units they would like to purchase from each seller. The buyers can buy between 0 and 4 units; it is irrelevant if they only buy from seller 1, only from seller 2, or from both sellers. To each buyer **one unit of the product is worth 20 ECU**. This valuation does not change throughout the entire experiment and is identical for all buyers.

Thus, as a buyer you receive the following period's profit:

$$\begin{aligned} & (\text{valuation} - \text{seller 1's selling price}) \cdot \text{number of units bought from seller 1 in the period} \\ & + (\text{valuation} - \text{seller 2's selling price}) \cdot \text{number of units bought from seller 2 in the period} \\ & = \text{your period's profit} \end{aligned}$$

The buyers' valuation **always** is 20 ECU.

If a product with a donation announcement is sold the buyer has to decide which of the five available charity organizations („UNICEF“, „SOS-Kinderdörfer“, „WWF“, „Brot für die Welt“ oder „Nürnberger Tafel e.V.“) will receive the donation generated by the purchase.

2.4 Second seller decision

After the buyers made their purchase decision the sellers receive information about the number of units sold in this period. Now, the sellers have to choose the amount per unit they actually would like to donate. **After the experiment, this amount will actually be donated to the charity organization chosen by the buyer.** Any amount equal or larger than zero may be chosen. The total actual donations to each charity organization generated in the course of the experiment will be promptly published on the laboratory's homepage.

As a seller you receive the following period's profit:

$$(selling\ price - actually\ donated\ amount\ per\ unit) \cdot number\ of\ units\ sold\ in\ the\ period$$
$$= your\ period's\ profit$$

2.5 Examples

Example 1:

In this example you are a **buyer**. Seller 1 offers the product at price of 18 ECU (including an announced donation of 3 ECU). For the same product seller 2 charges 15 ECU (without any donation announcement). If you as a buyer decide to buy 2 units from the first seller and 1 unit from the second seller the resulting profit in this period is:

$$\begin{aligned} & (20\ ECU - 18\ ECU) \cdot 2\ units + (20\ ECU - 15\ ECU) \cdot 1\ unit \\ &= 2\ ECU \cdot 2\ units + 5\ ECU \cdot 1\ unit \\ &= 4\ ECU + 5\ ECU \\ &= \underline{9\ ECU} \text{ (your profit in this period)} \end{aligned}$$

Example 2:

In this example you are a **buyer**. Seller 1 offers the product at price of 22 ECU (without any donation announcement). For the same product seller 2 charges 19 ECU (including an announced donation of 5 ECU). If you as a buyer decide to buy 3 units from the first seller and 1 unit from the second seller the resulting profit in this period is:

$$\begin{aligned} & (20\ ECU - 22\ ECU) \cdot 3\ units + (20\ ECU - 19\ ECU) \cdot 1\ unit \\ &= (-2\ ECU) \cdot 3\ units + 1\ ECU \cdot 1\ unit \\ &= (-6\ ECU) + 1\ ECU \\ &= \underline{-5\ ECU} \text{ (your profit in this period; in this case, a loss!)} \end{aligned}$$

Example 3:

In this example you are a **seller**. In this period you chose a price of 18 ECU. You decided to actually donate 2 ECU. In this period you sold a total of 3 units. Thus, you receive the following profit in this period:

$$\begin{aligned} & (18\ ECU - 2\ ECU) \cdot 3\ units \\ &= 16\ ECU \cdot 3\ units \\ &= \underline{48\ ECU} \text{ (your profit in this period)} \end{aligned}$$

Example 4:

In this example you are a **seller**. In this period you chose a price of 9 ECU. You decided to actually donate 12 ECU. In this period you sold a total of 4 units. Thus, you receive the following profit in this period:

$$\begin{aligned}
 & (9 \text{ ECU} - 12 \text{ ECU}) \cdot 4 \text{ unity} \\
 & = (-3 \text{ ECU}) \cdot 4 \text{ units} \\
 & = \underline{-12 \text{ ECU}} \text{ (your profit in this period; in this case, a loss!)}
 \end{aligned}$$

2.6 Summary of the decisions made

At the end of each period a summary of the period results will be displayed to sellers and buyers.

The **sellers** receive a summary of prices and announced donations of both sellers in the group. Additionally, sellers receive an individual calculation of their own profit in the period.

The **buyers** each receive an individual summary of their purchase decision and their profit in the period.

3. Summary

3.1 Sequence of decisions

	Seller decision	Buyer decision
1	set selling price	
2	announce the donation amount per unit	
3		decide how many units to buy from which seller; determine charity organisation (if applicable)
4	determine the amount to actually donate	

3.2 Calculation of profits

As **buyer** you receive the following profit in a period:

$ \begin{aligned} & (\text{valuation} - \text{seller 1's selling price}) \cdot \text{number of units bought from seller 1 in the period} \\ & + (\text{valuation} - \text{seller 2's selling price}) \cdot \text{number of units bought from seller 2 in the period} \end{aligned} $

= your profit in the period

Please note: The buyers' valuation **always** is 20 ECU.

As **seller** you receive the following profit in a period:

(selling price – actually donated amount per unit) • number of units sold in the period
= your profit in the period

Control Questions:

Please answer the following control questions. They only serve to familiarize you with the experiment and do not influence your profits. We will check your answers and clarify any remaining problems.

1. You and three other participants form a group.

☐ Correct ☐ Wrong

2. The group composition changes after each period.

☐ Correct ☐ Wrong

3. The buyers' valuation is 30 ECU.

☐ Correct ☐ Wrong

4. The sellers can choose the charity organization.

☐ Correct ☐ Wrong

5. The seller makes the actual donation per unit only after the buyers made their purchase decisions.

☐ Correct ☐ Wrong

6. Each buyer in a group gets informed about the purchase decision of the respective other buyer in the group.

☐ Correct ☐ Wrong

7. How many units per period can a seller maximally sell? _____ units

8. A seller chose to set a price of 17 ECU in this period. He actually wants to donate 5 ECU. In total, this seller sold 4 units in this period. What is his profit in this period (Please show calculations)?

The seller's profit in this period is: _____

9. Seller 1 offers the product at a price of 14 ECU (including a donation announcement of 4 ECU). For the same product seller 2 charges 8 ECU (without any donation announcement). If a buyer decides to buy 1 unit from the first seller and 2 units from the second seller, what is the buyer's resulting profit in this period (please show calculations)?

The buyer's profit in this period is: _____

10. Before the buyers' purchase decisions a seller announces to donate 3 ECU per unit. How much will this seller actually donate? _____ ECU

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